

WHAT IS CLAIMED IS:

1. A connector assembly comprising:
- 5 a connector housing comprising a connector having:
- a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;
- at least one substrate having at least one electrically conductive pathway associated therewith;
- 10 a cavity adapted to receive at least a portion of said at least one substrate;
- a plurality of first conductors disposed at least partly within said recess, said first conductors being configured to form an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and form an electrical pathway between said first conductors and said at least one
- 15 substrate; and
- a plurality of second conductors, at least one of said second conductors being in electrical communication with said at least one electrically conductive pathway of said at least one substrate.
2. The connector assembly of Claim 1, wherein at least a portion of said first
- 20 conductors are substantially coplanar and each include an effectively curved portion, the effective radius of each said effectively curved portion being different for each of said first conductors.
3. The connector assembly of Claim 2, wherein said effectively curved portions each comprises a substantially continuous bend radius.
- 25 4. The connector assembly of Claim 2, wherein said effectively curved portion of said first conductors comprises a plurality of bend segments.
5. The connector assembly of Claim 1, wherein said first conductors comprise at least three conductor segments, said at least three segments comprising:
- (i) at least a first segment oriented substantially normal to said at least
- 30 one substrate;

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- (ii) at least a second segment communicating with said at least first segment, said second segment having a substantially different angular orientation with respect to said at least one substrate than said at least first segment; and
- 5 (iii) at least a third segment communicating with said at least second segment, said third segment having a substantially different angular orientation with respect to said at least one substrate than said at least first or second segments.

6. The connector assembly of Claim 1, wherein said at least one substrate is  
10 disposed in substantially vertical orientation within, and substantially orthogonal to the front face of, said housing.

7. The connector assembly of Claim 6, wherein at least a portion of said first conductors are substantially coplanar and each include an effectively curved portion, the effective radius of each said effectively curved portion being different for each of said first  
15 conductors.

8. The connector assembly of Claim 6, wherein said first and second conductors mate with said at least one substrate at the top and bottom portions thereof, respectively.

9. The connector assembly of Claim 2, further comprising at least one  
20 electrical component disposed on said at least one substrate, wherein said at least one electrical component has an elevation below that of said first conductors.

10. The connector assembly of Claim 2, further comprising at least one conductor carrier, said carrier being adapted to retain said first conductors in a predetermined orientation.

25 11. A multi-port connector assembly comprising:  
a connector housing comprising a plurality of connectors each having:  
a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;  
at least one substrate having at least one electrically conductive pathway  
30 associated therewith, said at least one substrate being disposed in substantially orthogonal orientation with respect to a front face of said housing;

a cavity adapted to receive at least a portion of said at least one substrate;  
a plurality of first conductors disposed at least partly within said recess,  
said first conductors being configured to form an electrical contact with respective  
ones of said terminals when said modular plug is received within said recess, and  
5 form an electrical pathway between said first conductors and said at least one  
substrate; and

a plurality of second conductors, at least one of said second conductors  
being in electrical communication with said at least one electrically conductive  
pathway of said at least one substrate.

10 12. The connector assembly of Claim 11, wherein said first conductors are  
formed so as to be substantially coplanar in that portion of said conductors which mates  
with said at least one substrate.

15 13. The connector assembly of Claim 12, further comprising at least one  
conductor carrier disposed proximate to at least a portion of said first conductors, said at  
least one carrier adapted to at least retain said first conductors in said substantially  
coplanar orientation.

14. The connector assembly of Claim 13, wherein said at least one carrier is  
further adapted to maintain at least one predetermined separation between individual ones  
of said first conductors.

20 15. The connector assembly of Claim 14, wherein said at least one carrier is  
further adapted to maintain at least one predetermined separation between said first  
conductors of a first of said connectors and corresponding first conductors of a second of  
said connectors.

25 16. The connector assembly of Claim 12, further comprising at least one  
conductor carrier disposed proximate to at least a portion of said first conductors, said at  
least one carrier adapted to maintain at least one predetermined separation between said  
first conductors of a first of said connectors and corresponding first conductors of a second  
of said connectors.

30 17. The connector assembly of Claim 11, further comprising at least one  
conductor carrier, said carrier being adapted to retain said first conductors in a  
predetermined orientation.

18. The connector assembly of Claim 17, wherein said housing further comprises at least one aperture formed therein, said at least one carrier being adapted to be received at least partly within said at least one aperture so as to retain said at least one carrier in a substantially fixed position relative to said housing when said connector assembly is assembled.

19. The connector assembly of Claim 17, wherein said predetermined orientation comprises at least maintaining at least a portion of said first conductors substantially coplanar and separated from one another.

20. The connector assembly of Claim 19, wherein said at least one conductor carrier comprises a substantially unitary body having a plurality of grooves formed therein, said grooves further adapted to frictionally receive at least a portion of respective ones of said first conductors therein.

21. The connector assembly of Claim 20, wherein said first conductors and said plurality of grooves each include an effectively curved portion, the effective radius of each being different.

22. The connector assembly of Claim 11, wherein said first conductors comprise at least three conductor segments, said at least three segments comprising:

- (i) at least a first segment oriented substantially normal to said at least one substrate;
- (ii) at least a second segment communicating with said at least first segment, said second segment having a substantially different angular orientation with respect to said at least one substrate than said at least first segment; and
- (iii) at least a third segment communicating with said at least second segment, said third segment having a substantially different angular orientation with respect to said at least one substrate than said at least first or second segments.

23. The connector assembly of Claim 11, wherein at least two of said connectors are disposed in a port pair, said first conductors of each connector in said port pair being substantially coplanar, the plane of said first conductors of a first connector in said port pair being substantially parallel with that of the first conductors of a second connector in said port pair.

24. The connector assembly of Claim 11 wherein at least two of said connectors are disposed in a port pair, said first conductors of a first connector in said port pair being routed over at least a portion of their length to a corresponding one of said at least one substrate in a direction having an angular relationship to the corresponding portion of said first conductors associated with a second connector in said port pair.

25. The connector assembly of Claim 11 wherein at least two of said connectors are disposed in a port pair, said first conductors of a first connector in said port pair being routed over at least a portion of their length to a corresponding one of said at least one substrate in a direction having an angular relationship to the corresponding portion of said first conductors associated with a second connector in said port pair.

26. The connector assembly of Claim 25, wherein said at least portion of said first conductors comprises that proximate to said at least one substrate, and said angular relationship comprises routing the first conductors of said first connector in said port pair to mate with said at least one substrate in a direction which is substantially opposite to that of the corresponding portions of said first conductors of said second connector of said port pair.

27. The connector assembly of Claim 23, wherein said first and second conductors mate with said at least one substrate at the top and bottom portions thereof, respectively.

28. The connector assembly of Claim 27, further comprising at least one electrical component disposed on said at least one substrate, wherein said at least one electrical component has an elevation below that of said first conductors.

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29. A carrier for use within a modular connector assembly having a plurality of conductors, said carrier comprising:

a carrier body;

5 a plurality of grooves formed within said carrier body, said plurality of grooves being substantially coplanar within said body, said grooves further being adapted to receive corresponding ones of said conductors and maintain electrical separation between individual ones of said conductors.

30. The carrier of Claim 29, wherein said body is a unitary component formed via a molding process.

10 31. The carrier of Claim 30, wherein said carrier body is molded around said conductors.

32. The carrier of Claim 29, wherein said plurality of grooves are adapted to frictionally retain said conductors therein.

15 33. The carrier element of Claim 29, wherein said carrier is adapted to maintain at least a predetermined space between said conductors and another carrier in proximity thereto.

34. The carrier of Claim 29, wherein said conductors comprise at least three conductor segments, said at least three segments comprising:

- 20 (i) at least a first segment;
- (ii) at least a second segment communicating with said at least first segment, said second segment not being co-linear with said at least first segment; and
- 25 (iii) at least a third segment communicating with said at least second segment, said third segment not being co-linear with said at least first or second segments.

35. The carrier of Claim 29, wherein said body comprises two sections, said two sections adapted to fit over and retain said conductors in relative position.

36. The carrier of Claim 35, wherein said plurality of grooves are formed entirely within one of said two carrier sections.

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37. A method of manufacturing a multi-port connector, comprising:  
forming a connector housing having at least one port pair of modular jack recesses,  
and at least one cavity communicating with said recesses;

forming at least two primary substrates;

5 forming at least two sets of first conductors, said first conductors each having a  
distal end and a modular plug contacting portion, said act of forming said conductors  
comprising forming individual ones of said conductors such that the distal ends of said  
first conductors in each set which mate with the corresponding one of said at least two  
primary substrates are oriented in an coplanar array which is angled with respect to said  
10 modular plug contacting portion;

mating said distal ends of said conductors of a first of said at least two sets of  
conductors with a corresponding one of said substrates to form a first insert assembly;

mating said distal ends of said conductors of a second of said at least two sets of  
conductors with a corresponding one of said substrates to form a second insert assembly;

15 and

inserting said first and second insert assemblies at least partly into said cavity.

38. ~~The method of Claim 37, further comprising:~~

~~forming at least two sets of second conductors; and~~

~~mating each of said second sets of conductors with corresponding ones of said~~  
20 ~~primary substrates.~~

39. The method of Claim 37, wherein said act of forming at least two sets of  
first conductors comprises forming the conductors in a first of said at least two sets such  
that their distal ends are substantially opposite (180 degrees) from the distal ends of a  
second of said at least two sets of conductors.

25 40. The method of Claim 39, wherein said act of forming at least two sets of  
first conductors comprises forming the conductors in each of said at least two sets such  
that their distal ends are substantially coplanar with the other conductors in that set.

41. The method of Claim 37, wherein said act of forming at least two sets of  
first conductors comprises forming each conductor in at least three segments, by:

30 (i) forming at least a first segment;

- (ii) forming at least a second segment communicating with said at least first segment, said second segment not being co-linear with said at least first segment; and
- (iii) forming at least a third segment communicating with said at least second segment, said third segment not being co-linear with said at least first or second segments.

42. The method of Claim 40, wherein said act of forming at least two sets of first conductors comprises forming each conductor in at least three segments, by:

- (i) forming at least a first segment;
- (ii) forming at least a second segment communicating with said at least first segment, said second segment not being co-linear with said at least first segment; and
- (iii) forming at least a third segment communicating with said at least second segment, said third segment not being co-linear with said at least first or second segments.

43. A multi-port connector assembly comprising:

means for housing comprising a plurality of connectors each having:

a recess adapted for receiving at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;

at least one substrate means having at least one electrically conductive pathway associated therewith, said at least one substrate means being disposed in substantially orthogonal orientation with respect to a front face of said means for housing;

cavity means adapted for receiving at least a portion of said at least one substrate means;

a plurality of first conductor means disposed at least partly within said recess, said first conductor means being configured to form an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and for forming an electrical pathway between said first conductor means and said at least one substrate means; and



a plurality of second conductor means, at least one of said second conductor means being in electrical communication with said at least one electrically conductive pathway of said at least one substrate means.

44. A carrier for use within a modular connector assembly having a plurality of means for conducting electrical signals, said carrier comprising:

a carrier body means;

means for retaining said means for conducting, said means for conducting being retained in a substantially coplanar configuration within said body means, said means for retaining further being adapted to maintain electrical separation between individual ones

of said means for conducting;

wherein said conductor means are shaped at their distal portions to be substantially curved, each of said substantially curved distal portions of said conductor means having a different effective radius; and

wherein said means for retaining substantially comply with said distal portions of said means for conducting.

45. A connector assembly comprising:

a connector housing comprising a connector having:

a recess adapted to receive at least a portion of a modular plug, said modular plug having a plurality of terminals disposed thereon;

at least one substrate having at least one electrically conductive pathway associated therewith;

a cavity adapted to receive at least a portion of said at least one substrate, said at least one substrate being disposed within said cavity such that said at least one substrate is substantially orthogonal to a front face of said connector housing;

a plurality of first conductors disposed at least partly within said recess, said first conductors being configured to form an electrical contact with respective ones of said terminals when said modular plug is received within said recess, and form an electrical pathway between said first conductors and said at least one substrate; and

a plurality of second conductors, at least one of said second conductors being in electrical communication with said at least one electrically conductive pathway of said at least one substrate.

46. A method of manufacturing a multi-port connector, comprising the steps
- 5 of:
- forming a connector housing having at least one port pair of modular jack recesses for receiving corresponding ones of modular jacks therein, and at least one cavity communicating with said recesses for receiving components of said connector;
  - forming at least two primary substrates for receiving at least portions of conductors
  - 10 thereon;
  - forming at least two sets of first conductors for conducting electrical current, said first conductors each having a distal end and a modular plug contacting portion, said act of forming said conductors comprising forming individual ones of said conductors such that the distal ends of said first conductors in each set which mate with the corresponding one
  - 15 of said at least two primary substrates are oriented in an coplanar array which is angled with respect to said modular plug contacting portion;
  - forming at least two sets of second conductors for conducting electrical current, said second conductors each having a distal end and an external device contacting portion;
  - mating said distal ends of said conductors of a first of said at least two sets of first
  - 20 conductors with a corresponding first one of said at least two substrates;
  - mating said distal ends of said conductors of a first of said at least two sets of second conductors with said first substrate, said acts of mating with said first substrate forming a first insert assembly;
  - mating said distal ends of said conductors of a second of said at least two sets of
  - 25 first conductors with a corresponding second one of said at least two substrates;
  - mating said distal ends of said conductors of a second of said at least two sets of second conductors with said second substrate, said acts of mating with said second substrate forming a second insert assembly; and
  - inserting said first and second insert assemblies at least partly into said cavity.
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